AD 288 860

REPORT NO. FTDM-2803
DATE: 2 November 1962

MATERIAL - SEALANT TOP COAT - DETERMINE NEED FOR

This report incomplete without GD/FW Reports FMS-0005 and FMS-0008

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CONVAIR
FORT WORTH

Department 6
FWP 2376 - 2 - 53

TEST DATA MEMORANDUM

F-TDM NO. 2803
MODEL B-58
TEST NO. 51-0908

TEST: MATERIAL: SEALANT TOP COAT - DETERMINE NEED FOR

OBJECT: To determine if B-58 fuel tank sealants possess adequate fuel resistance without the use of MIL-S-4383(B) top coat sealant (EC-776).

TEST SPECIMENS AND PROCEDURE: Test specimens and test procedure are described in Table I.

RESULTS: Test results are contained in Tables II and IV.

DISCUSSION: MIL-S-4383(B) top coat sealant (EC-776) is presently used over B-58 fuel tank sealants directly exposed to fuel in order to increase their fuel resistance. Sealant manufacturers have claimed for some time, however, that a top coat sealant is no longer needed for protection of these sealants since they possess adequate fuel resistance without the benefit of top coats. If it can be established that EC-776 serves no useful purpose in the protection of B-58 fuel tank sealants and the Air Force (WADD) concurs, the production cost of the B-58 can be reduced substantially. The purpose of this test was to review available test data to determine if EC-776 top coat sealant is necessary for adequate fuel resistance of B-58 fuel tank sealants.

The test data reported herein were obtained from FGT-2594 Addendum 1 and, as noted in Table I, all test specimens were prepared and tested according to FMS-0008(B) even though this may not have been their applicable procurement specification. Only those tests of FMS-0008(B) which required fuel immersion were performed on the three sealant materials.

Overall, EC-776 top coat sealant appears to be detrimental to the sealants when they are exposed to heat following fuel immersion. This condition is clearly seen by a comparison of the tensile strength and elongation values of the materials tested (Tables II through IV). Also, it should be pointed out that the elongation of all materials top coated with EC-776 is much less than those without a top coat (Tables II through IV).

It is evident from the weight loss test results (Tables II through IV), that EC-776 affords some protection against fuel extraction of the sealants. The weight loss of the top coated materials is less than that of the materials without a top coat. It should be noted, however, that in no instance did the weight loss of the sealants without a top coat exceed the requirements of FMS-0008(B).

The PR-1422 peel strength test after fuel immersion shows 67% cohesive failure "without a top coat" and 100% cohesive failure "with a top coat" (Table II). Because of the many variables inherent in the peel test and since one of the 3 specimens tested "without a top coat" had 100% cohesive failure, this difference in % cohesive failure between "with" and "without a top coat" is not considered significant.

CONCLUSION: The B-58 fuel tank sealants described in this report possess adequate fuel resistance without MIL-S-4383(B) top coat sealant (EC-776).

TEST DATES: 7-8-60 to 12-23-60.

DATE: 21 February 1961

BY M. J. Carroll
CHECKED H. P. Owen
APPROVED K E Duncan

TABLE I

TEST SPECIMENS AND PROCEDURE

I. Test Specimens

Sealant	Sealant Type	Procurement Specification	Vendor
PR-1422	General Purpose	FMS-0008(B)	Products Research Co. Los Angeles, Calif.
EC-1610	Faying Surface	FMS-0008(B)	Minnesota Mining & Mfg.Co. Los Angeles, Calif.
EC-1520	Access Door	FMS-0005	Minnesota Mining & Mfg.Co. Los Angeles, Calif.
EC-776	Top Coat	MIL-S-4383(B)	Minnesota Mining & Mfg.Co. Los Angeles, Calif.

II. Test Procedure

A. Specimen Preparation

1. Two sets of specimens were prepared for the tests listed in Tables II through IV according to FMS-0008(B).

2. After the sealant had cured 7 days at standard conditions one set of specimens was coated with EC-776 top coat sealant. The thickness of the EC-776 top coat was approximately 0.006 inches.

3. All specimens were allowed to cure a total of 14 days at standard conditions before being environmentally conditioned.

Note: Standard conditions refer to an area with a temperature of 77°±2°F and a relative humidity of 50%±5%.

B. Environmental Conditioning

All specimens, both top coated and without top coat, were environmentally conditioned as specified in FMS-0008(B).

C. Specimen Testing

All specimens were tested according to the procedures listed in FMS-0008(B).

Table III

EC-1610 Test Results

Test	FMS-0008B par. No.	Environmental Conditions	FMS-0008(B) Requirements	Without EC-776 Top Coat	With EC-776 Top Coat
Thermal Rupture	4.5.8	Standard Cure (1)	Retain 10 psi air pressure with no more than 1/8 inch deformation	.02" Deformation Pass	.02" Deformation Pass
		7 days immersion in Fuel (2) at 140°F	Retain 10 psi air pressure with no more than 1/8 inch deformation	.02" Deformation Pass	.04" Deformation Pass
Thermal Shock	4.5.9	Standard Cure (1)	No loss of adhesion, interfacial sponging, blistering, or shrinking	Pass	Pass
		7 days immersion in Fuel (2) at 140°F	No loss of adhesion, interfacial sponging, blistering, or shrinking	Pass	Pass
		7 days immersion in Fuel (2) +3% NaCl water at 140°F	No loss of adhesion, interfacial sponging, blistering, or shrinking	Pass	Pass
Peel Strength	4.5.12	Standard Cure (1)	None	10 lbs/inch 100% Cohesive failure	10 lbs/inch 100% Cohesive failure
		7 days immersion in Fuel (2) at 140°F	25 lbs./inch minimum with 100% cohesive failure	10 lbs/inch 100% Cohesive failure	9 lbs/inch 100% Cohesive failure
		7 days immersion in Fuel (2) +3% NaCl water at 140°F	25 lbs./inch minimum with 100% cohesive failure	17 lbs/inch 100% Cohesive failure	16 lbs/inch 100% Cohesive failure
Corrosion	4.5.13	20 days immersion in Fuel (2) +3% NaCl water at 140°F	No softening, blistering, loss of adhesion, or corrosion of metal under the sealant	Pass	Pass
Weight Loss	4.5.14	72 hours immersion in Fuel (2) at 140°F	10% maximum	1.74 %	-.69 % (3)
		168 hours immersion in Fuel (2) at 140°F	10% maximum	3.47 %	1.65 %
Bend	4.5.14	72 hours immersion in Fuel (2) at 140°F	No cracking	Pass	Pass
		168 hours immersion in Fuel (2) at 140°F	No cracking	Pass	Pass
Tensile Strength	4.5.15	Standard Cure (1)	200 psi min.	125 psi	153 psi
		3 days immersion in Fuel (2) at 140°F followed by 7 days exposure to dry air at 275°F	100 psi min.	171 psi	83 psi
		24 hour exposure to dry air at 275°F followed by 7 days immersion in Fuel (2) at 140°F	100 psi min.	102 psi	120 psi
		60 days immersion in Fuel (2) at 140°F	100 psi min.	128 psi	97 psi
Elongation	4.5.15	Standard Cure (1)	200 % min.	105 %	110 %
		3 days immersion in Fuel (2) at 140°F followed by 7 days exposure to dry air at 275°F	100 % min.	103 %	32 %
		24 hours exposure to dry air at 275°F followed by 7 days immersion in Fuel (2) at 140°F	100 % min.	148 %	68 %
		60 days immersion in Fuel (2) at 140°F	100 % min.	161 %	46 %
Reparability	4.5.17	Standard Cure (1)	No lifting, blistering, or loss of adhesion	12 lbs/inch 100% cohesive failure Pass	13 lbs/inch 100% cohesive failure Pass
		3 days immersion in Fuel (2) at 140°F followed by 7 days exposure to dry air at 275°F	No lifting, blistering, or loss of adhesion	12 lbs/inch 100% cohesive failure Pass	9 lbs/inch 100% cohesive failure Pass

Notes: (1) Standard cure (FMS-0008B par. 4.4.3.2) - 14 day cure at 77°±2°F and a relative humidity of 50%±5%.
(2) Fuel was MIL-S-3136 Type III.
(3) Gain in weight

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Table IV.

EC-1520 Test Results

Test	FMS-0008(B) par. No.	Environmental Conditions	FMS-0008(B) Requirements	Without EC-776 Top Coat	With EC-776 Top Coat
Thermal Rupture	4.5.8	Standard Cure (1)	Retain 10 psi. air pressure with no more than ½ inch deformation	.04" Deformation Pass	.05" Deformation Pass
		7 days immersion in Fuel (2) at 140°F	Retain 10 psi air pressure with no more than ½ inch deformation	.06" Deformation Pass	.04" Deformation Pass
Thermal Shock	4.5.9	Standard Cure (1)	No loss of adhesion, interfacial sponging, blistering, or shrinking	Pass	Pass
		7days immersion in Fuel (2) at 140°F	No loss of adhesion, interfacial sponging, blistering, or shrinking	Pass	Pass
		7days immersion in Fuel (2) +3% NaCl water at 140°F	No loss of adhesion, interfacial sponging, blistering, or shrinking	Pass	Pass
Peel Strength	4.5.12	Standard Cure (1)	None	11 lbs/inch 100% Cohesive failure	12 lbs/inch 100% Cohesive failure
		7 days immersion in Fuel (2) at 140°F	25 lbs./inch minimum with 100% cohesive failure	10 lbs/inch 100% Cohesive failure	11 lbs/inch 100% Cohesive failure
		7days immersion in Fuel (2) +3% NaCl water at 140°F	25 lbs./inch minimum with 100% cohesive failure	19 lbs/inch 100% Cohesive failure	20 lbs/inch 100% Cohesive failure
Corrosion	4.5.13	20 days immersion in Fuel (2) +3% NaCl water at 140°F	No softening, blistering, loss of adhesion, or corrosion of metal under the sealant	Pass	Pass
Weight Loss	4.5.14	72 hours immersion in Fuel (2) at 140°F	10% maximum	2.39 %	.40 %
		168 hours immersion in Fuel (2) at 140°F	10% maximum	3.25 %	.58%
Bend	4.5.14	72 hours immersion in Fuel (2) at 140°F	No cracking	Pass	Pass
		168 hours immersion in Fuel (2) at 140°F	No cracking	Pass	Pass
Tensile Strength	4.5.15	Standard Cure (1)	200 psi min.	136 psi	164 psi
		3 days immersion in Fuel (2) at 140°F followed by 7 days exposure to dry air at 275°F	100 psi min.	149 psi	62 psi
		24 hours exposure to dry air at 275°F followed by 7 days immersion in Fuel (2) at 140°F	100 psi min.	113 psi	131 psi
		60 days immersion in Fuel (2) at 140°F	100 psi min.	107 psi	93 psi
Elongation	4.5.15	Standard Cure (1)	200 % min.	113 %	113 %
		3 days immersion in Fuel (2) at 140°F followed by 7 days exposure to dry air at 275°F	100 % min.	106 %	30 %
		24 hours exposure to dry air at 275°F followed by 7 days immersion in Fuel (2) at 140°F	100 % min.	165 %	54 %
		60 days immersion in Fuel (2) at 140°F	100 % min.	149 %	36 %
Reparability	4.5.17	Standard Cure (1)	No lifting, blistering, or loss of adhesion	11 lbs/inch 100% cohesive failure Pass	14 lbs/inch 100% cohesive failure Pass
		3 days immersion in Fuel (2) at 140°F followed by 7 days exposure to dry air at 275°F	No lifting, blistering, or loss of adhesion	11 lbs/inch 100% cohesive failure Pass	10 lbs/inch 100% cohesive failure Pass

Notes: (1) Standard cure (FMS-0008B par. 4.4.3.2) - 14 day cure at 77°±2°F and a relative humidity of 50%±5%.
(2) Fuel was MIL-S-3136 Type III.

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Department of the Air Force

C O N V A I R
A DIVISION OF GENERAL DYNAMICS CORPORATION
(FORT WORTH)
FORT WORTH 1, TEXAS

PROCUREMENT SPECIFICATION

SPECIFICATION NO. FMS-0005
DATE 3 December 1956

TITLE SEALING COMPOUND: ACCESS DOOR, HIGH TEMPERATURE RESISTANT (260°F) (FOR INTEGRAL FUEL TANKS AND CABIN PRESSURE AREAS)

APPROVED BY:

Department 6

PROCUREMENT SPECIFICATION

Department 6 — FW-178-4-56

1. DESCRIPTION:

This specification covers high temperature resisting, curing type, sealing compounds to be used for sealing and repairing integral fuel tanks and pressurized enclosures. The sealing compounds shall be of a high flow, brushable type suitable for use in the faying surfaces of removable structural components. The sealing compounds shall resist repeated exposures to temperatures from -65° to +260°F.

2. REQUIREMENTS:

2.1 QUALIFICATION: The sealing compound shall meet all requirements of this specification when tested within the application time specified in paragraph 2.3.5.

2.2 COMPOSITION: The sealing compound covered by this specification may be formulated from any ingredients which will yield a product of high quality and one suitable for its intended purpose. The sealing compound may cure by the addition of a separate curing agent to the base compound and shall not depend on solvent evaporation for curing.

2.3 PROPERTIES:

2.3.1 Color: The cured sealing compound shall be pink or red. If an accelerator is used, it shall possess sufficient color contrast with the base compound to permit easy detection of unmixed or incompletely mixed sealing compound.

2.3.2 Specific Gravity: The specific gravity of the cured sealing compound shall not exceed 1.80 when determined in accordance with paragraph 3.5.1.

2.3.3 Nonvolatile Content: The nonvolatile content of freshly mixed sealing compound shall not be less than 97 percent by weight when determined in accordance with paragraph 3.5.2.

2.3.4 Viscosity of Base Compound: The mixed sealing compound shall be suitable for brush application on faying surfaces and the base compound shall have a viscosity within the range of 7,500 to 12,000 poises, when tested in accordance with paragraph 3.5.3.

2.3.5 Application Time: The mixed sealing compound shall have an application time of not less than seven hours from the time of mixing and shall be suitable for application during that period when tested in accordance with paragraph 3.5.4.

2.3.6 Tack-Free Time: The mixed sealing compound shall cure to a tack-free condition within 48 hours from the time of mixing when tested in accordance with paragraph 3.5.5.

2.3.7 Cure Time: The sealing compound, when cured and tested in accordance with paragraph 3.5.6, shall have an instantaneous durometer hardness of at least 35.

2.3.8 Resistance to Thermal Rupture: When tested in accordance with paragraph 3.5.7, the cured sealing compound shall retain a pressure of 10 psi with a maximum deformation of 0.13 inch measured from the surface of the test panel not exposed to pressure to the point of maximum deformation in the sealing compound.

2.3.9 Resistance to Thermal Extrusion: The cured sealing compound, when tested in accordance with paragraph 3.5.8, shall not extrude more than 0.10 inches from the tube ends and not more than 0.25 inches from the drilled holes. Also, the sealing compound shall not shrink.

2.3.10 Low Temperature Flexibility: The cured sealing compound shall withstand low temperature flexure without cracking, checking or loss of adhesion, when tested in accordance with paragraph 3.5.9.

2.3.11 Cohesive Strength: The cohesive strength of the cured sealing compound shall not exceed 175 psi, when tested in accordance with paragraph 3.5.10. The adhesive strength shall exceed the cohesive strength.

2.3.12 Corrosion: The cured sealing compound shall reveal no softening, blistering, leaching, loss of adhesion or evidence of corrosion of the metal under the sealing compound, when tested in accordance with paragraph 3.5.11.

2.3.13 Weight Loss: The cured sealing compound, when tested in accordance with paragraph 3.5.12, shall reveal a weight loss of not more than 10 percent by weight and shall not crack when bent 180 degrees over a 1/8-inch diameter mandrel after 168 hours exposure.

2.3.14 Tensile Strength and Elongation: When subjected to the environmental conditions listed below, then tested in accordance with paragraph 3.5.13, the ultimate tensile strength and the ultimate elongation of the cured sealing compound shall not be less than the following values:

2.3.14 (Cont'd)

CONDITION	TENSILE STRENGTH (PSI)	ELONGATION (%)
a. Standard Cure	75	120
b. 30 Days in MIL-H-3136 Type III Test Fluid at 140° ± 2°F	70	100
c. Seven Days at 260° ± 5°F with no Fluid Immersion	75	50

2.3.15 Accelerated Storage Stability: After being aged in accordance with paragraph 3.5.14, the base compound shall show no skinning, hardening, separation or settling. The accelerator shall reveal no adverse effects from aging and shall be capable of being restored, by normal agitation, to a condition suitable for use. The aged base compound and the aged accelerator, when mixed, shall meet the requirements of this specification (within ± 10 percent) for application time and tack-free time, as specified in paragraphs 2.3.5 and 2.3.6, respectively. The aged base compound shall meet the original requirements (within ± 10 percent) for viscosity specified in paragraph 2.3.4.

2.3.16 Reparability: The sealing compound shall be suitable for repair of itself, as well as for repairing any abraded, fuel-aged sealing compound conforming to this specification. When tested in accordance with paragraph 3.5.15, a second coat of the sealing compound applied over a freshly cured film of the same material shall show satisfactory bonding and shall reveal no lifting, blistering, loss of adhesion or other irregularities.

2.3.17 The cured sealing compound shall not emit toxic gases or objectionable odors at temperatures up to 260°F.

2.3.18 It is desirable that the sealing compound shall not be injurious to personnel when handled with reasonable precautions.

3. TESTS:

3.1 CLASSIFICATION OF TESTS: The inspection and testing of access door sealing compounds shall be classified as follows:

(a) Evaluation Tests: Evaluation tests are those tests performed on samples of production sealing compounds which are submitted to Convair for approval.

(b) Acceptance Tests: Acceptance tests are those tests performed on individual lots of approved sealing compounds which are submitted to Convair for acceptance.

3.2 EVALUATION TESTS: The evaluation tests of access door sealing compounds shall consist of all the tests of this specification as described in paragraph 3.5, "Test Methods".

3.2.1 Sample Requirements: The evaluation test sample of the access door sealing compound upon which qualification is desired shall consist of one gallon of the base compound and a proper amount of accelerator.

3.2.2 Responsibility for Conducting the Evaluation Tests: Convair shall conduct all evaluation tests unless written approval to do so is granted to a specific manufacturer. Approval of a manufacturer to conduct the tests is contingent upon the manufacturer's demonstrated ability, so it shall be necessary for the manufacturer to submit to Convair a complete description of test facilities, previous experience in conducting the required tests, and the qualifications of test personnel.

When the evaluation tests are to be conducted by laboratories other than the Convair Engineering Test Laboratory, the manufacturer and Convair shall agree upon the detailed test procedures and the test schedules. Convair shall reserve the right to witness and to monitor all tests.

3.2.3 Test Reports: When submitting an evaluation test sample, the manufacturer shall furnish Convair with test data showing that the sealing compound satisfactorily conforms with the requirements of this specification.

3.2.3 (Cont'd)

The test laboratory conducting the evaluation tests shall prepare a complete report, referencing each test to the appropriate paragraph of this specification. The test report shall include the results of all tests required by this specification, the necessary data for each test condition, and all additional data required to define and evaluate the results of each test.

3.2.4 Approval: Convair approval of a sealing compound shall be based upon successful completion of all the tests of this specification.

3.2.5 Rejection: Failure to comply with the requirements of this specification during or following any of the tests shall be reason for rejection.

3.3 ACCEPTANCE TESTS: The acceptance tests shall consist of the following sampling tests:

3.3.1 Sampling Tests: A sample of sealing compound, representative of each lot on order, shall be selected from each lot and subjected to the tests listed below, as described in paragraph 3.5, "Test Methods". A lot shall consist of all sealing compound manufactured at one time from one batch. The following are the minimum requirements for acceptance testing; the actual extent of testing to be conducted for proof of compliance with these requirements shall be determined by Convair:

(a)	Viscosity of Base Compound,	Paragraph 3.5.3
(b)	Application Time,	Paragraph 3.5.4
(c)	Cure Time,	Paragraph 3.5.6
(d)	Thermal Extrusion,	Paragraph 3.5.8
(e)	Cohesive Strength,	Paragraph 3.5.10
(f)	Weight Loss,	Paragraph 3.5.12

3.3.2 Manufacturer's Affidavit: In order for a lot of sealing compound to be accepted, the manufacturer shall submit affidavits to Convair with each lot to show that the manufacturing processes and the ingredients are the same as those used in the fabrication of the approved evaluation samples.

3.4 TEST CONDITIONS:

3.4.1 General: All test specimens shall be prepared, cured and tested in an area with a temperature of 77° ± 2°F and a relative humidity of 50 ± 5 percent, unless otherwise specified.

3.4.2 Preparation of Metal Panels:

3.4.2.1 Description of Panels: Unless otherwise specified, "standard" metal panels shall be 0.040 by 2-7/8 by 6-inch clad 7075 aluminum alloy conforming to Specification QQ-A-287, T-6. The metal panels required for the tests are listed below:

TEST	PANEL DIMENSIONS	MATERIAL	NUMBER REQUIRED
3.5.7	.040x3-1/2x3-1/2	Standard	2
3.5.9	Standard	Standard	4
3.5.11	Standard	QQ-A-283 Aluminum	2
3.5.15	Standard	Standard	2

3.4.2.1 (Cont'd)

In addition to the metal panels, the following material is required:

TEST	DESCRIPTION	MATERIAL	NUMBER REQUIRED
3.5.8	Tube, 1/8 I.D.x3/16 O.D.x6 inches	Aluminum	1
3.5.10	Block, 1/2x1x1 inch	Specifications	
		QQ-A-283 Aluminum	18
		MIL-S-5059 Stainless Steel	18
		MIL-T-7993 Titanium	18

3.4.2.2 Cleaning of Panels: The metal test panels shall be cleaned in accordance with the following procedure:

(a) Apply wipe-off naphtha cleaner (Table I) with a brush or saturated cheese cloth.

(b) Wipe dry with clean dry cheesecloth.

(c) Clean with a brush or cheesecloth saturated with phosphoric acid cleaner (Table II).

(d) Wipe immediately with clean cheesecloth saturated with distilled water. If the acid cleaner has dried prior to this operation, repeat steps (c) and (d).

(e) Wipe dry with clean dry cheesecloth, then air dry for 30 minutes at a temperature of 160°F before applying sealing compound.

3.4.2.2. (Cont'd)

TABLE I
WIPE-OFF NAPHTHA CLEANER

Ingredient	Specification	Percent by Weight (± 1%)
Solvent	P-S-661A	80.0
Aliphatic Petroleum Naphtha	TT-N-95	10.0
Butyl Alcohol	TT-B-846	10.0

TABLE II
PHOSPHORIC ACID CLEANER

Ingredient	Specification	Percent by Weight (± 1%)
Phosphoric Acid	O-P-313 (Class A)	12.0
Citric Acid	USP	16.0
Synthetic Soap	Triton X-100*	8.0
Methyl Ethyl Ketone	TT-M-261	12.0
Distilled Water	Commercial Grade	52.0

*Manufactured by Rohm and Haas Company

3.4.3 Preparation of Test Specimens:

3.4.3.1 Preparation of Sealing Compound: A sufficient quantity of sealing compound, but no less than 175 grams, shall be prepared for the tests. The sealing compound shall be as thoroughly mixed as possible in a five-minute period, using a Semco Model SP-1350 Mixer (or equivalent). The mixed sealing compound shall have a minimum inclusion of air. Whenever possible, the sealing compound shall be used to fill cartridges for use with a Semco No. 250 gun (or equivalent), immediately after mixing.

3.4.3.2 Application and Curing of Sealing Compound: The sealing compound shall be applied to the test panels with the thickness specified in each test. If necessary, the specimen thickness may be built up by successive applications, with a two-hour period between applications. "Standard Cure", as used in this specification, shall be a 14-day cure at standard conditions. All tests on cured sealing compound shall begin within two days of the completion of the 14-day cure.

3.5 TEST METHODS:

3.5.1 Specific Gravity: Test specimens shall be prepared with freshly mixed base compound and accelerator. During the initial curing period, any surface bubbles which occur shall be burst with a sharp pointed instrument. Before being removed from the mold, the sealing compound shall receive a standard 14-day cure. Three specimens, measuring approximately one inch square and 1/4-inch thick, shall be cut from the cured sealing compound. Each of the specimens shall be weighed accurately to the nearest milligram. Then the specimens shall be dipped in methyl alcohol and, while still wet, suspended in distilled water at a temperature of $77^{\circ} \pm 2^{\circ}$F and reweighed. The specific gravity shall be calculated as follows:

$$\text{Specific Gravity} = \frac{\text{Weight in Air}}{\text{Weight in Air-Weight in Water}}$$

3.5.2 Nonvolatile Content: Five to ten grams of sealing compound shall be transferred to a tared covered cup approximately three inches in diameter and 3/4 inch in depth. The specimen shall be weighed to the nearest milligram and the weight of the sealing compound calculated. The cover shall then be removed and the sealing compound heated for 24 hours at 158°F. It shall then be cooled in a desiccator at standard conditions, the cover replaced, and the specimen reweighed. The percentage of the total nonvolatile content shall be calculated as follows:

$$\text{Percent nonvolatile content} = \frac{\text{Final weight}}{\text{Initial weight}} \times 100$$

3.5.3 Viscosity of Base Compound: The viscosity of the base compound shall be determined with a sample placed in a standard half pint can (2-7/8 inches in diameter by 2-7/8 inches deep). The can shall be filled with base compound to within 1/2 inch of the top, covered, and stored at standard conditions for eight hours. The base compound shall be thoroughly mixed by stirring slowly for three minutes. The container shall be closed and the compound shall be allowed to stand for one hour. The compound shall be tested using a Brookfield Model RVF Viscosimeter with a No. 7 Spindle at 2 RPM and the readings obtained shall be converted to poises. The instrument shall be run for one minute in the compound prior to the first reading.

3.5.4 Application Time: The base compound, the accelerator and a sealing compound application gun and cartridge shall be stabilized at standard conditions for a minimum of eight hours prior to mixing. Then the base compound and accelerator shall be mixed in sufficient quantity to fill a standard Semco sealing compound gun cartridge with a Semco 250-N-4-4 nozzle. The gun and sealing compound shall be maintained at standard conditions throughout the test. The application of sealing compound and the flow rate observation tests shall be conducted as follows:

From two to three inches of sealing compound shall be extruded initially to clear entrapped air and a minimum of one inch of sealing compound shall be extruded prior to each observation. Within 15 minutes from the start of mixing, the sealing compound shall be extruded onto a tared sheet of cellophane, using a gun pressure of 90 ± 5 psi, for an exactly-measured time interval. A time interval shall be established within the range of 10 to 60 seconds, so that approximately 10 grams of sealing compound are extruded. Following each observation, the application gun shall be returned to an environment with standard conditions, the extruded sealing compound shall be accurately weighed, and the flow rate (in grams per minute) shall be calculated. The observations shall be repeated at the end of time intervals equivalent to one-third and two-thirds of the minimum specified application time of the sealing compound, and the observations shall be continued until a minimum flow rate of 15 grams per minute is measured. A curve of flow rate versus time shall be plotted and the time at which that curve intersects the 15 grams per minute line shall be the application time.

3.5.5 Tack-Free Time: At the end of the rated tack-free time of the sealing compound, a small sheet of polyethylene film measuring 0.004 ± 0.002 inch thick shall be pressed with a one-ounce weight (covering an approximate area of two square inches) onto each of several sealing compound specimens. The film shall then be progressively withdrawn normal to the surface of the specimen. The time at which the film no longer adheres tightly to the sealing compound shall be the tack-free time.

3.5.6 Cure Time: Mixed sealing compound shall be applied to a non-adherent surface to produce a specimen approximately one inch square with a thickness of 1/8-inch. The sealing compound shall be allowed to cure at standard conditions for a period equal to twice the tack-free time as determined in paragraph 3.5.5. The instantaneous hardness of the specimen shall be determined by placing it over a sheet of 40 durometer rubber 1/4-inch thick and using a Shore A Durometer or Rex Instrument as specified in Federal Test Method Standard No. 601, Method 3021.

3.5.7 Resistance to Thermal Rupture: Two panels of clad aluminum alloy shall be prepared with a coating of the sealing compound applied to each panel. The sealant coating shall be 1/8-inch thick by 2 inches in diameter and shall receive a standard cure. The test panels shall be 3-1/2 inches square with a thickness of 0.040 inches and with a 1/4-inch diameter hole in the center. When preparing the test specimens, the hole shall be filled with sealing compound. Following standard cure, one of the test panels shall be immersed in Specification MIL-H-3136, Type III, Test Fluid, for 168 hours at a temperature of 140° ± 2°F. Immediately upon removal from the fluid, the panel which was immersed, as well as the panel which received only a standard cure, shall be clamped in a thermal rupture test fixture, using a suitable gasket. The panel shall be positioned in the fixture so that the sealing compound is inside the fixture chamber. Using a pressure regulator, a pressure of 10 psi shall be applied to the test specimens. While applying the pressure, the fixture shall be placed in an oven stabilized at a temperature of 260° ± 5°F so that the fixture and the specimens reach a temperature of 260° ± 5°F in approximately 15 minutes. The specimens shall remain at 260° ± 5°F for one hour from the time that temperature is reached.

3.5.8 Resistance To Thermal Extrusion: A test specimen shall be prepared by drilling 2 holes, with a 1/16-inch diameter, two inches apart through one wall of an aluminum tube measuring 1/8-inch I.D. by 3/16-inch O.D. by 6 inches long. The tube shall be injected full of sealing compound and, after standard cure, the excess shall be removed flush with the holes and the ends of the tube. The specimen shall then be subjected to a temperature of 260° ± 5°F for 24 hours.

3.5.9 Low Temperature Flexibility: Four standard test panels shall be prepared by applying the sealing compound to an area measuring 1-1/2 by 4 inches in the center of each panel. The sealing compound shall be 0.094 inches thick and the thickness shall be accurately controlled by using a metal pressing plate coated with polyethylene film and separated from the test panels by four metal spacers of 0.094-inch thickness. After standard cure, two of the test panels shall be subjected to a temperature of 260° ± 5°F for seven days. Following the high temperature conditioning period, the two conditioned panels and the two remaining panels which received only a standard cure shall be placed in a low temperature flexibility test jig (see Specification MIL-S-7502). The test panels shall be subjected to a temperature of -65° ± 2°F and, after stabilizing, shall remain at that temperature for two hours. While at that temperature, the test panels shall be bent rapidly around the curved portion of the flexibility test jig, with the sealant on the exterior of the radius. The panels shall then be removed and examined.

3.5.10 Cohesive Strength: Twenty-seven test specimens (nine each of aluminum, stainless steel and titanium) shall be prepared. Each specimen shall consist of two blocks, measuring one inch square by 1/2-inch thick, which are bonded together with a 1/32-inch thick coating of the sealing compound. After standard cure, three specimens of each type shall be immersed in Specification MIL-H-3136, Type III, Test Fluid for seven days at a temperature of 140° ± 2°F. Three additional specimens of each type shall be immersed for seven days at a temperature of 140° ± 2°F in a covered glass vessel containing a two-layer liquid comprised of a three percent aqueous sodium chloride solution and Specification MIL-H-3136, Type III, Test Fluid with the specimens completely immersed in the salt water solution. The remaining three specimens of each type shall be immersed for 70 days at a temperature of 140° ± 2°F in Specification MIL-H-3136, Type III, Test Fluid. Within one hour from the end of each immersion

3.5.10 (Cont'd)

period, each of the specimens shall be fastened in a Tate-Emery testing machine and tested. The machine shall be operated with a load application rate of 5000 pounds per minute. The cohesive strength shall be measured as the average force in pounds per square inch required to cause the sealing compound to separate within itself. The adhesive strength shall be greater than the cohesive strength.

3.5.11 Corrosion: Two unclad aluminum alloy test panels with standard dimensions shall be prepared with two parallel sealing compound fillets, spaced one inch apart, on each panel. Each fillet shall measure 1/16-inch thick by 3/4-inch wide by 5 inches long and shall extend to within 1/2-inch of the edges of the panel. After a standard cure, all portions of the metal panels which are not covered with sealing compound shall be covered with topcoat sealing compound (Specification MIL-S-4383). After the topcoat sealing compound has cured, the panels shall be immersed vertically for 20 days in a covered glass vessel containing a two-layer liquid comprised of a three percent aqueous sodium chloride solution and Specification MIL-H-3136, Type III, Test Fluid, in a manner such that 1-5/8 inches of the fillets are exposed to the salt solution, 1-5/8 inches are exposed to the test fluid and the remainder is exposed to the air-vapor mixture. The temperature during the test shall be maintained at 140 $\pm$ 2°F. Immediately upon removal from the liquid, the test panels shall be examined for softening, blistering, leaching, loss of adhesion, or evidence of corrosion of the metal under the sealing compound.

3.5.12 Weight Loss: Mixed sealing compound shall be applied on a non-adherent surface to form a sheet 0.090 $\pm$ 0.015 inches thick and shall be given a standard cure. Four specimens measuring 1-1/8 inches in diameter shall be cut from the cured sealing compound. The specimens shall be weighed to the nearest milligram, then two specimens shall be immersed in each of two closed vessels containing 900 cc. of Specification MIL-H-3136, Type III, Test Fluid, and shall be maintained at a temperature of 140° $\pm$ 2°F for 72 hours. The containers shall be fitted with an air reflux tube. The fluid shall be changed at 24-hour intervals. After 72 hours exposure, the specimens shall be removed from the fluid and air dried for 16 hours at 120° $\pm$ 2°F, then cooled to standard temperature and reweighed. The percentage of weight loss shall be calculated. Following the weight loss calculations, the speci-

3.5.12 (Cont'd)

mens shall be bent 180 degrees over a 1/8-inch diameter mandrel and examined. If the sealing compound has not lost more than 10 percent of its weight and has not cracked or powdered, the specimens shall be replaced in the closed containers with new fluid and immersion shall be continued at a temperature of 140° ± 2°F for an additional 96 hours, changing fluid every 24 hours. At that time, the weight loss shall be recalculated and another bend test shall be conducted.

3.5.13 Tensile Strength and Elongation: Mixed sealing compound shall be cast on a non-adherent surface to form a sheet 0.125 ± 0.015 inches thick and shall be given a standard cure. Thirty specimens, measuring one by five inches, shall be cut from the sealing compound and five specimens shall be exposed to each of the environmental conditions specified in paragraph 2.3.14. Where fluid immersion is specified, the volume of fluid shall be 15 parts to one part sealing compound, by volume. The fluid shall be changed at 14-day intervals. Following fluid immersion, tensile test specimens shall be cut from the conditioned specimens, using the die and the procedure outlined in Federal Test Method Standard No. 601, Method 4111 (Die III), and the specimens shall be benchmarked. Then, at standard conditions, the specimens shall be tested on a tensile testing machine with a jaw separation rate of two inches per minute. From the test results, the average values shall be determined for the ultimate tensile strength and the ultimate elongation.

3.5.14 Accelerated Storage Stability: A 250-gram sample of base compound in a tightly closed one-pint container, and a tightly closed container of accelerator, shall be stored at a temperature of 100° ± 5°F for 14 days. After cooling at standard conditions for a minimum of 24 hours, tests shall be conducted on viscosity, application time and tack-free time, in accordance with paragraphs 3.5.3, 3.5.4 and 3.5.5, respectively.

3.5.15 Reparability: The mixed sealing compound shall be applied to two standard test panels and the coating thickness shall be approximately 1/8-inch. After standard cure, one of the panels shall be immersed in Specification MIL-H-3136, Type III, Test Fluid, at a temperature of 140° ± 2°F for three days, and then shall be subjected to a temperature of 260° ± 5°F for seven days with no fluid immersion.

3.5.15 (Cont'd)

Following the conditioning period, both panels shall be cleaned and recoated with a 1/8-inch thick film of freshly mixed sealing compound. After the sealing compound has immobilized, one end of a 3 by 12-inch strip of screen (wire fabric 60 to 80 mesh, brass or monel of approximately 0.008-inch diameter) shall be placed on the sealing compound on each panel, leaving a loose end six inches long. Then, an additional 1/8-inch thick coating of sealing compound shall be applied over the screen. After standard cure, a one-inch wide strip shall be cut through the screen and the sealing compound to the metal along the full length of the screen. The loose end of the one-inch wide strip shall be clamped in one jaw of a suitable testing machine and the adjacent end of the panel shall be fastened in the other jaw. The testing machine and its operation shall be in accordance with Federal Test Method Standard No. 601, Method 8031, and the machine shall be operated with a jaw separation rate of two inches per minute.

4. APPLICABLE DOCUMENTS: The specifications shall be the issue in effect on the date of, or as defined in, the contract or purchase order. Compliance with any other issue of these specifications shall be subject to approval by Convair.

If the requirements of any of the publications referred to herein conflict with the requirements of this specification, the requirements of this specification shall apply.

4.1 Specifications:

Federal:

QQ-A-283	Aluminum Alloy (7075); Plate and Sheet
QQ-A-287	Aluminum Alloy, Clad (7075) (Aluminum-5.6 Zinc-2.5 Magnesium-1.6 Copper) Plate and Sheet
TT-B-846	Butyl Alcohol, Normal
TT-M-261	Methyl-Ethyl-Ketone (For use in organic coatings)
TT-N-95	Naphtha; Petroleum, Aliphatic
O-P-313	Phosphoric Acid (Class A)
P-S-661A	Solvent, Dry Cleaning

Military

MIL-S-5059	Steel, Corrosion Resistant (18-8), Plate, Sheet and Strip
MIL-S-4383	Sealing Compound, Topcoat, Fuel Tank, Buna-N Type
MIL-T-7993	Titanium, Sheet, Strip and Plate (Unalloyed) Class 1
MIL-H-3136	Hydrocarbon-Fluid, Standard Test (Type III)

4.2 Standards

Federal

Federal Test Method Standard No. 601

Rubber; Sampling and Testing

5. MANUFACTURER'S RESPONSIBILITY: The manufacturer shall be responsible for the manufacture of the sealing compound to be procured in accordance with the requirements of this specification. None of the requirements of this specification shall be interpreted to shift to Convair any responsibility for the manufacture of sealing compound procured in accordance with the requirements of this specification.

5.1 MATERIALS, PROCESSES, AND WORKMANSHIP: Workmanship shall conform to high grade commercial manufacturing practices. The materials and processes used shall conform to approved specifications.

5.2 DEVIATIONS AND CHANGES: No changes shall be made in materials or formulations after a product has been approved and accepted by Convair, unless a specific request is made to Convair and written authorization is received from Convair.

6. DATA REQUIREMENTS: In lieu of the requirements for submitting data under applicable specifications as set forth herein, engineering data shall be furnished to Convair as follows:

6.1 Reports:

(a) Six copies of data in accordance with paragraph 3.2.3.

(b) Six copies of affidavits in accordance with paragraph 3.3.2 shall be submitted by the manufacturer with each lot of sealing compound received by Convair.

NOTE: Acceptance of reports or other information by Convair shall not constitute Convair approval of the reports or information.

7. PACKAGING: Sealing compound shall be packaged in kit form. Each kit shall contain one gallon of base compound (or the amount specified in the purchase order) and the amount of accelerator required for proper curing of the sealing compound. The material shall be from one batch. The packaging shall be sufficiently durable to prevent damage during shipment.

7.1 Base Compound: Each container of base compound shall be legibly and permanently marked as follows:

Base Compound Quantity_____

Convair Specification FMS-0005

Manufacturer_____ Code No._____

Date of Manufacture_____ Batch No._____

Mixing Instructions:_____

Warnings:_____

7.2 Accelerator: Each container of accelerator shall be legibly and permanently marked as follows:

Accelerator Quantity_____

Convair Specification FMS-0005

Manufacturer_____ Code No. _____

Use with Base Compound of Manufacturer_____ Code No._____

Date of Manufacture_____ Batch No._____

Warnings:_____

7.3 Sealing Compound Kit: Each kit of sealing compound containing a package of base compound and a package of accelerator shall be legibly and permanently marked as follows:

Sealing Compound: Access Door,

High Temperature Resistant (260°F)

7.3 (Cont'd)

(For Integral Fuel Tanks and Cabin Pressure Areas)

Quantity_____

Convair Specification FMS-0005

Manufacturer_____ Code No._____

Date of Manufacture_____ Batch No._____

Mixing Instructions:_____

Purchase Order No._____

Warnings:_____

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
(FORT WORTH)

AMENDMENT NO. 1

DATED 15 April 1958
TO CONVAIR SPECIFICATION
NO. FMS-0005
DATED 3 December 1956

This Amendment forms a part of and should be attached to Convair Specification FMS-0005 - SEALING COMPOUND: ACCESS DOOR, HIGH TEMPERATURE RESISTANT (260°F) (FOR INTEGRAL FUEL TANKS AND CABIN PRESSURE AREAS), dated 3 December 1956. This Amendment shall become effective immediately upon issue.

(1) Page 8, Para. 3.4.2.2 - Change to read:

"Cleaning of Panels: The metal test panels shall be cleaned in accordance with the following procedure:

(a) Apply wipe-off naphtha cleaner (Table I) with a brush or saturated cheesecloth.

(b) Wipe dry with clean cheesecloth.

(c) Clean with a brush or cheesecloth saturated with phosphoric acid cleaner (Table II), diluted to one part in 8 parts of distilled water.

(d) Wipe immediately with clean cheesecloth saturated with distilled water. If the acid cleaner has dried prior to this operation, repeat steps (c) and (d).

(e) Wipe dry with clean cheesecloth, then air dry for 30 minutes at standard conditions, or heat dry for 15 minutes at a temperature of 130°F ± 10°F."

REASON: To coordinate the cleaning procedures of this specification with the accepted cleaning procedures used in production.

LaR

APPROVED BY:

H K Bailey for R.C.

Department 6

C O N V A I R
A DIVISION OF GENERAL DYNAMICS CORPORATION
(FORT WORTH)
FORT WORTH 1, TEXAS

PROCUREMENT SPECIFICATION

SPECIFICATION NO. FMS-0008(B)
DATE 8 January 1957
SUPERSEDING FMS-0008(A)
DATED: 30 June 1955

TITLE: SEALANT: FUEL TANK AND CABIN PRESSURE
(High Temperature)

APPROVED BY:

L. E. Johnson

CHANGE INDEX

Revision "B" of FMS-0008 constitutes a complete rewriting and rearrangement of the specification to make it agree with the requirements and test methods established for upgraded sealing compounds suitable for use at 275°F.

PROCUREMENT SPECIFICATION

Department 6 — FW-190-4-56

1. DESCRIPTION:

1.1 This specification covers high temperature resistant, accelerated, synthetic rubber sealing compounds to be used for sealing and repairing integral fuel tanks and pressurized enclosures. The sealing compounds shall be suitable for repeated exposures to temperatures within the range of -65°F to +275°F.

2. CLASSIFICATION:

2.1 The sealing compound shall be of the following classes:

Class A - High flow sealing and repair material suitable for application in faying surfaces.

Class B - Low flow sealing and repair material suitable for application by injection or extrusion gun and spatula.

2.2 DASH NUMBERS: The following dash numbers shall be used to designate the minimum application time in hours:

Class A - Dash numbers shall be -1/2, -2, -4, and -8.

Class B - Dash numbers shall be -1/2, -2, -4, -8, and -12.

Example: Class A-2 shall designate a high flow sealing compound with an application time of 2 hours. Class B-1/2 shall designate an extrusion gun sealing compound with an application time of 1/2 hour.

3. REQUIREMENTS:

3.1 QUALIFICATION: The sealing compound shall meet all of the requirements of this specification when tested in accordance with Para. 4.5, Test Methods.

3.2 MATERIAL COMPOSITION: The basic ingredient used in the manufacture of the sealing compound covered by this specification may be any type of synthetic rubber including the polysulfide type. The sealing compound may cure by the addition of a separate curing agent to the base compound and shall not depend on solvent evaporation for curing.

3. REQUIREMENTS:

3.3 PROPERTIES:

3.3.1 Color: If an accelerator is used, it shall possess sufficient color contrast to the base compound to permit easy identification of an unmixed or incompletely mixed sealing compound. Neither the base compound nor the cured sealing compound shall be red nor pink in color.

3.3.2 Specific Gravity: The specific gravity of the cured sealing compound shall not exceed 1.60 when determined in accordance with Para 4.5.1.

3.3.3 Nonvolatile Content: The nonvolatile content of the freshly mixed sealing compound shall not be less than the values specified below when tested in accordance with Para. 4.5.2.

Class A - 90 percent by weight

Class B - 95 percent by weight

3.3.4 Viscosity of Base Compounds: Class A sealing compound shall be suitable for application in faying surfaces, and the viscosity of the base compound shall not exceed 12,000 poises. Class B sealing compound shall be suitable for mixing and shall not exceed 18,000 poises when tested in accordance with Para. 4.5.3.

3.3.5 Flow: Freshly mixed Class B sealing compound shall exhibit an initial flow within the limits of 1/4 to 1-1/2 inches when a cylindrical section formed in a flow test jig is allowed to flow under its own weight on a vertical surface. In addition, the sealing compound shall retain a flow within the limits of 1/8 to 1-1/2 inches throughout the entire application time when tested in accordance with Para. 4.5.4.

3.3.6 Application Time: The mixed sealing compound shall have an application time of not less than the time in hours specified in Table I, after addition of the accelerator, and shall remain suitable for application during that period when tested in accordance with Para. 4.5.5.

3. REQUIREMENTS:

3.3.6 Application Time:

TABLE I

APPLICATION TIME

Class A	Hours	Class B	Hours
A - 1/2	1/2	B - 1/2	1/2
A - 2	2	B - 2	2
A - 4	4	B - 4	4
A - 8	8	B - 8	8
		B - 12	12

3.3.7 Tack-Free Time: The mixed sealing compound shall cure to a tack-free condition in not more than the time in hours specified in Table II after the addition of the accelerator. Test in accordance with Para. 4.5.6.

TABLE II

TACK-FREE TIME AND CURING RATE

Class A	Tack-Free Time (Hours)	Curing Rate (Hours)	Class B	Tack-Free Time (Hours)	Curing Rate (Hours)
A - 1/2	10	30	B - 1/2	10	30
A - 2	24	48	B - 2	24	48
A - 4	36	72	B - 4	30	60
A - 8	50	100	B - 8	48	96
			B - 12	60	120

3.3.8 Curing Rate: The sealing compound, after curing under standard conditions for not more than the time specified in Table II, shall have an instantaneous durometer hardness of not less than 35 when tested inaccordance with Para. 4.5.7.

3. REQUIREMENTS:

3.3.9 Resistance to Thermal Rupture: When tested in accordance with Para. 4.5.8, the Class B sealing compound shall retain a pressure of 10 psi with no more than 1/8 inch deformation measured from the surface of the test panel not exposed to pressure to the point of maximum deformation in the sealing compound.

3.3.10 Resistance to Thermal Shock: When tested in accordance with Para. 4.5.9, the cured sealing compound shall not separate from the panels as a result of loss of adhesion or interface sponging, and shall not shrink, sponge, nor blister excessively.

3.3.11 Resistance to Thermal Extrusion: The cured sealing compound, when tested in accordance with Para. 4.5.10, shall not extrude more than 1/10 inch from the tube ends and not more than 1/4 inch from the drilled holes. Also, the sealing compound shall not shrink.

3.3.12 Low Temperature Flexibility: The sealing compound, when tested in accordance with Para. 4.5.11, shall withstand 130 cycles of the flexibility test at -65°F without cracking, checking, or loss of adhesion.

3.3.13 Peel Strength: The peel strength of the cured sealing compounds to aluminum surfaced aluminum alloy, QQ-A-287; stainless steel, MIL-S-5059, composition G; and titanium panels, MIL-T-7993, Class 1, shall be 25 pounds minimum when tested in accordance with Para. 4.5.12. The adhesive strength shall exceed the cohesive strength.

3.3.14 Corrosion: The cured sealing compound, when tested in accordance with Para. 4.5.13, shall show no visual evidence of softening, blistering, or loss of adhesion, and there shall be no evidence of corrosion of the metal under the sealing compound.

3.3.15 Weight Loss: The weight loss shall not exceed 10% by weight, when tested in accordance with Para. 4.5.14. The sealing compound shall not crack when bent 180 degrees over a 1/8 inch diameter mandrel after 168 hours exposure.

3.3.16 Tensile Strength and Elongation: When tested in accordance with Paragraph 4.5.15, the ultimate tensile strength and ultimate elongation of the cured sealing compound shall not be less than the following values:

3. REQUIREMENTS:

3.3.16 (Cont'd)

CONDITION	TENSILE STRENGTH(PSI)	ELONGATION (%)
(a) Standard cure	200	200
(b) 30 days immersion in fluid MIL-H-3136, Type III, at 140°F	125	150
(c) 60 days immersion in fluid MIL-H-3136, Type III, at 140°F	100	100
(d) Seven days at 275°F	125	100
(e) 72 hours immersion in fluid MIL-H-3136, Type III, at 140°F followed by 275°F for seven days.	100	100
(f) 24 hours at 275°F followed by seven days immersion in fluid, MIL-H-3136 Type III, at 140°F.	100	100

3.3.17 Accelerated Storage Stability: After being stored in accordance with Para. 4.5.16, the base compound shall show no skinning, hardening, separation, or settling. The accelerator shall reveal no adverse effects from being stored in accordance with Para. 4.5.16 and shall be capable of being restored, by normal agitation, to a condition suitable for use. The aged base compound and the aged accelerator, when mixed, shall meet the requirements of this specification for flow, application time, and tack-free time as specified in Paragraphs 3.3.5, 3.3.6, and 3.3.7, respectively. The aged base compound shall meet the original requirements for viscosity specified in Para. 3.3.4.

3. REQUIREMENTS:

3.3.18 Reparability: Class A and B sealing compound, when tested in accordance with Para. 4.5.17, shall be suitable for repairing minor breaks in itself or each other, as well as for repairing breaks in abraded fuel-aged sealing compound conforming to this specification which have been exposed to MIL-H-3136, Type III fuel. A second coat of the sealing compound, applied over a freshly cured film of the material, shall show satisfactory bonding and no lifting, blistering, loss of adhesion, or other film irregularities.

3.3.19 The cured sealing compound shall not emit toxic gases or objectionable odors at temperatures up to 275°F.

3.3.20 It is desirable that the sealing compound shall not be injurious to personnel when handled with reasonable precautions.

4. TESTS:

4.1 CLASSIFICATION OF TESTS: The inspection and testing of sealing compounds shall be classified as follows:

(1) Evaluation Tests: Evaluation tests are those tests performed on samples of production sealing compounds which are submitted to Convair for approval.

(2) Acceptance Tests: Acceptance tests are those tests performed on individual lots of approved sealing compounds which are submitted to Convair for acceptance.

4.2 EVALUATION TESTS: The evaluation tests on sealing compounds shall consist of all the tests of this specification as described in Para. 4.5.

4.2.1 Sample Requirements: The evaluation test sample of sealing compound upon which qualification is desired shall consist of one gallon of the base compound and a proper amount of accelerator.

4. TESTS:

4.2.2 Responsibility for Conducting the Evaluation Tests: Convair shall conduct all evaluation tests unless otherwise specified in writing. Approval to conduct the tests is contingent upon the manufacturer's demonstrated ability to perform the tests. The manufacturer shall submit to Convair a complete description of test facilities, previous experience in conducting the required tests, and the qualifications of test personnel.

When the evaluation tests are to be conducted by laboratories other than the Convair Engineering Test Laboratory, the manufacturer and Convair shall agree upon the detailed test procedures and the test schedules. Convair shall reserve the right to witness and to monitor all tests.

4.2.3 Test Reports: When submitting an evaluation test sample, the manufacturer shall furnish Convair with test data showing that the sealing compound satisfactorily conforms with the requirements of this specification.

The Test Laboratory conducting the evaluation tests shall prepare a complete report, referencing each test to the appropriate paragraph of this specification. The Test Report shall include the results of all tests required by this specification, the necessary data for each test condition, and all additional data required to define and evaluate the results of each test.

4.2.4 Approval: Convair approval of a sealing compound shall be based upon successful completion of all the tests of this specification.

4.2.5 Rejection: Failure to comply with the requirements of this specification during or following any of the tests shall be reason for rejection.

4.3 ACCEPTANCE TESTS: The acceptance tests shall consist of the following sampling tests:

4.3.1 Sampling Tests: A sample of sealing compound, representative of each lot on order, shall be selected from each lot and subjected to the tests listed below, as described in Para. 4.5. A lot shall consist of all sealing compound manufactured at one time from one batch. The following are the minimum requirements for acceptance testing; the actual extent of testing to be conducted for proof of compliance with these requirements shall be determined by Convair:

4. TESTS:

4.3.1 Sampling Tests: (Cont'd)

(1)	4.5.2	- Nonvolatile Content
(2)	4.5.3	- Viscosity of Base Compounds
(3)	4.5.4	- Flow
(4)	4.5.5	- Application Time
(5)	4.5.6	- Tack-Free Time
(6)	4.5.7	- Curing Rate
(7)	4.5.8	- Resistance to Thermal Rupture
(8)	4.5.9	- Resistance to Thermal Shock
(9)	4.5.12	- Peel Strength (Omit 70-day Test)
(10)	4.5.14	- Weight Loss

4.3.2 Manufacturer's Affidavit: In order for a lot of sealing compound to be accepted, the manufacturer shall submit affidavits to Convair with each lot to show that the manufacturing processes and the ingredients are the same as those used in the fabrication of the approved evaluation samples.

4.4 TEST CONDITIONS:

4.4.1 General: All test specimens shall be prepared, cured, and tested in an area with a temperature of 77° ± 2°F and a relative humidity of 50 ± 5 percent, unless otherwise specified.

4.4.2 Preparation of Metal Panels:

4.4.2.1 Description of Panels: Unless otherwise specified, standard test panels shall be 0.040 x 2-7/8 x 6 inch clad 7075 aluminum alloy conforming to Specification QQ-A-287, T-6. The test panels required for the tests are listed in Table III.

4. TESTS:

TABLE III.

Test	Panel Dimensions (Inches)	Number Required
4.5.8 Resistance to Thermal Rupture	0.040 x 3-1/2 x 3-1/2	2
4.5.9 Resistance to Thermal Shock	0.040 x 2-7/8 x 6	3
4.5.11 Low Temperature Flexibility	0.040 x 2-7/8 x 6	4
4.5.12 Peel Strength	0.040 x 2-7/8 x 6	9
	0.020 x 2-7/8 x 6 Stainless Steel	9
	0.020 x 2-7/8 x 6 Titanium	9
4.5.13 Corrosion	0.040 x 2-7/8 x 6 (QQ-A-283)	2
4.5.17 Repairability	0.040 x 2-7/8 x 6	2

In addition to the metal panels described above, an aluminum tube six inches long, with a 1/8 inch inside diameter and a 3/16 inch outside diameter, is required for the test in Para. 4.5.16, Resistance to Thermal Extrusion.

4. TESTS:

4.4.2.2 Cleaning of Panels: The test panels shall be cleaned in accordance with the following procedure:

(1) Apply wipe-off naphtha cleaner (Table IV) with a brush or saturated cheesecloth.
(2) Wipe dry with clean dry cheesecloth.
(3) Clean with a brush or cheesecloth saturated with phosphoric acid cleaner (Table V).
(4) Wipe immediately with clean cheesecloth saturated with distilled water. If acid cleaner has dried prior to this operation, repeat steps (3) and (4).
(5) Wipe dry with clean dry cheesecloth, then air dry for 30 minutes at a temperature of 160°F before applying sealing compound.

TABLE IV.

WIPE-OFF NAPHTHA CLEANER

Ingredient	Specification	Percent by Wt. (± 1%)
Solvent	P-S-661A	80.0
Aliphatic Petroleum Naphtha	TT-N-95	10.0
Butyl Alcohol	TT-B-846	10.0

TABLE V.

PHOSPHORIC ACID CLEANER

Ingredient	Specification	Percent by Wt. (± 1%)
Phosphoric Acid	O-P-313 (Class A)	12.0
Citric Acid	USP	16.0
Synthetic Soap	Triton X-100*	8.0
Methyl Ethyl Ketone	TT-M-261	12.0
Distilled Water	Commercial Grade	52.0

* Manufactured by Rohm and Haas Company

4. TESTS:

4.4.3 Preparation of Test Specimens:

4.4.3.1 Preparation of Sealing Compound: A sufficient quantity of sealing compound, but no less than 175 grams, shall be prepared for the tests. The sealing compound shall be as thoroughly mixed as possible in a five-minute period, using a Semco Model SP-1350 mixer (or equivalent). The mixed sealing compound shall have a minimum inclusion of air. Whenever possible, the sealing compound shall be used to fill cartridges for use with a Semco No. 250 gun (or equivalent), immediately after mixing.

4.4.3.2 Application and Curing of Sealing Compound: The sealing compound shall be applied to the test panels with the thickness specified in each test. If necessary, Class A sealing compound may be built up to the specified specimen thickness by successive applications, with a two-hour period between applications. All reference to a standard cure in this specification shall mean a 14-day cure at standard conditions. All tests on the cured sealing compound shall begin within two days of the completion of the 14-day cure.

NOTE: In order to assure that a sealing compound has attained a high percentage of its ultimate physical characteristics, the manufacturer may recommend that a sealing compound be cured, at standard conditions, for an extended period, not to exceed 30 days, in the following tests:

4.5.9 Resistance to Thermal Shock
4.5.14 Weight Loss
4.5.15 Tensile Strength and Elongation

4.4.3.3 Application of Topcoat Sealing Compound: Where topcoat sealing compound is required, it shall be applied by the method and with the thickness specified by the manufacturer. The topcoat sealing compound shall be compatible with sealing compounds conforming to this specification, shall not be detrimental to the sealing characteristics of those compounds, and shall also afford corrosion protection for the fuel tank surfaces.

4. TESTS:

4.5 TEST METHODS:

4.5.1 Specific Gravity: A quantity of freshly accelerated compound shall be used. During the initial curing stage, a sharp pin or needle shall be employed to burst any surface bubbles which become visible. All test specimens shall have a standard cure after which they shall be removed from the mold. Three specimens approximately 1 x 1 x 1/4 inch shall be cut from the sealing compound film with a sharp razor blade. After being weighed accurately to the nearest milligram, the samples shall be dipped in methyl alcohol and then, while wet, be immediately suspended in distilled water at $77^{\circ} \pm 2^{\circ}F$ and reweighed. The specific gravity shall be computed from the following formula:

$$\frac{\text{Weight in Air}}{\text{Weight in Air - Weight in Water}} = \text{Specific Gravity}$$

4.5.2 Nonvolatile Content: Five to ten grams of sealing compound shall be transferred to a tared covered cup approximately three inches in diameter and 3/4 inch in depth. The specimen shall be weighed to the nearest milligram and the weight of the sealing compound calculated. The cover shall then be removed and the sealing compound heated for 24 hours at $158^{\circ}F$. It shall then be cooled in a desiccator at standard conditions, the cover replaced, and the specimen reweighed. The percentage of the total nonvolatile content shall be calculated as follows:

$$\text{Percent nonvolatile content} = \frac{\text{Final weight}}{\text{Initial weight}} \times 100$$

4.5.3 Viscosity of Base Compound: The viscosity shall be determined with a sample of base compound placed in a standard 1/2 pint can (2-7/8 inch diameter by 2-7/8 inch depth). The can shall be filled with base compound to within 1/2 inch of top, covered, and stored at standard conditions for eight hours. The base compound shall be thoroughly mixed by stirring slowly for three minutes. The container shall then be closed and allowed to stand for one hour. The Brookfield RVF Viscosimeter shall be used and the reading obtained shall be converted to poises. For Class A base compound, the No. 4 or No. 5 spindle at 10 rpm shall be used; for Class B compound, the No. 7 spindle at 2 rpm shall be used. The instrument shall be run one minute in the base compound before the first reading is taken.

4. TESTS:

4.5.4 Flow: The Class B base compound, accelerator, and sealing compound application gun shall be stabilized at standard conditions for at least eight hours before a 250-gram lot of base compound is mixed with a proper amount of accelerator. The mixed sealing compound shall be promptly used to fill a standard Semco sealant gun having a Semco 250 N-4-4 nozzle. The gun and the sealing compound shall be maintained at standard conditions throughout the test. The test shall be conducted with the flow test jig shown in Figure 1. The depth of plunger tolerance is critical and shall be controlled within the tolerance during all tests. The flow test jig shall be placed on a table with the front face upward and with the plunger depressed to the limit of its travel. Within 15 minutes from the beginning of mixing, enough of the mixed sealing compound shall be extruded from the application gun to fill the recessed cavity of the jig. The sealing compound shall then be leveled off even with the surface of the block. Within 10 seconds after the leveling operation, the jig shall be placed upright on its base and the plunger shall be advanced immediately to the forward limit of its travel. The initial flow measurement shall be taken exactly 30 minutes after the sealing compound has been applied to the test jig. The time intervals for all subsequent flow measurements shall be taken from the beginning of the initial reading. The flow shall be measured from a line tangent to the lower edge of the plunger to the extreme point of flow. As the application time of the sealing compound progresses, the flow test shall be repeated at the time intervals specified in Table VI.

TABLE VI

MINIMUM SPECIFIED APPLICATION TIME	INTERVALS AT WHICH FLOW TESTS SHALL BE CONDUCTED
1/2 Hour	Initial Reading Only
2 Hours	Initial 50 Minutes 90 Minutes
4 Hours	Initial 2 Hours 3-1/2 Hours
8 Hours	Initial 2-1/2 Hours 5 Hours 7-1/2 Hours
12 Hours	Initial 4 Hours 7-1/2 Hours 11 Hours

4. TESTS:

4.5.5 Application Time:

4.5.5.1 Class A Sealing Compounds: The base compound and accelerator shall be stabilized at standard conditions for at least eight hours before a sample of base compound is mixed with the proper amount of accelerator sufficient to fill a standard 1/2 pint can (2-7/8 inches in diameter by 2-7/8 inches in depth) to within 1/2 inch from the top. This can shall be kept tightly covered except when testing the viscosity. Fifteen minutes after the start of mixing, the sealing compound shall be tested for viscosity, using a Brookfield Model RVF viscosimeter with a No. 7 spindle at 10 rpm. This observation shall be repeated at 30-minute intervals thereafter until the viscosity reading exceeds 2500 poises. A graph of viscosity versus time shall be prepared and the time at which the resultant curve crosses the 2500-poise line shall be established as the application time.

4.5.5.2 Class B Sealing Compounds: The base compound, accelerator, and sealant application gun shall be stabilized at standard conditions for at least eight hours before a 350-gram lot of base compound is mixed with a proper amount of accelerator. The mixed sealing compound shall be promptly used to fill a standard Semco sealant gun cartridge having a Semco 250 N-4-4 nozzle. The gun and sealing compound shall be maintained at standard conditions throughout the test. The application test shall be conducted as follows:

The gun shall be attached to a constant air supply of 90 ±5 psi. Two to three inches of sealant shall be extruded initially to clear trapped air and at least one inch of sealant must be extruded prior to each observation.

Flow rate observations shall be conducted as follows: Within 15 minutes after the start of mixing, the sealing compound shall be extruded onto a tared sheet of cellophane, using the specified gun pressure, for an exactly measured time interval, which may vary from 10 to 60 seconds, so that approximately 10 grams of sealing compound are extruded. The gun shall be returned to the standard temperature chamber, the extruded sealing compound weighed, and the grams flow per minute calculated. This observation shall be repeated at the end of time intervals equivalent to one-third and two-thirds of the minimum specified application time of the sealing compound, and continued until 15 grams per minute or less are extruded. A graph of extrusion rate versus time shall be prepared, and the time at which the resultant curve crosses the 15 grams per minute line shall be taken as the application time. Results shall be expressed in grams per minute.

4. TESTS:

4.5.6 Tack-Free-Time: At the end of the rated tack-free time, a 1 x 6 inch polyethylene film measuring 0.004 ±0.002 inch thick shall be pressed with a one-ounce (approximately two square inches) weight onto each of several sealing compound specimens. The film shall then be progressively withdrawn at right angles to the surface of the sealing compound. The time at which the film no longer adheres tightly to the sealing compound shall be considered the tack-free time.

4.5.7 Curing Rate: A specimen of Class A sealing compound approximately 1/8 x 1 x 1 inch shall be prepared as described in para. 4.4.3.2. After application of the final coat, however, the sealing compound shall be cured as specified in para. 3.3.8. The instantaneous hardiness shall then be determined by placing the specimen over a piece of 40 durometer rubber 1/4 inch thick and using a Shore A durometer or Rex instrument in accordance with Federal Test Method Standard No. 601, Method 3021.

4.5.7.1 A specimen of Class B sealing compound approximately 1/4 x 1 x 1 inch shall be prepared and allowed to cure as specified in para. 3.3.8. The instantaneous hardness shall be determined with a Shore A durometer or Rex instrument in accordance with Federal Test Method Standard No. 601, Method 3021.

4.5.7.2 When tested, the hardness in each case shall be in accordance with para. 3.3.8.

4.5.8 Resistance to Thermal Rupture: Two test specimens shall be prepared with a two-inch diameter fillet of Class B sealing compound applied to each test panel. A mold shall be used to assure a uniform sealing compound thickness of 1/8 inch. The test panels shall be 0.040 x 3-1/2 x 3-1/2 inches, 7075 aluminum sheet with a 1/4 inch diameter hole in the center of each panel. When preparing the test specimens, the hole shall be filled with sealing compound. The sealing compound fillets shall be given a standard cure. One of the panels shall be placed in MIL-H-3136 Type III fluid at 140°F for 168 hours. Remove from the fluid and immediately apply panel, using a suitable gasket, to the clamp jig shown in Figure 2. The panel shall be positioned on the jig so that the sealing compound is within the jig chamber. Apply 10 psi air pressure using an air regulator. Place jig in an oven stabilized at 275°F so that clamp jig and panel reach the 275°F temperature in approximately 15 minutes. Maintain clamp jig in the oven for a total time of one hour after temperature is reached. After testing as described, the fluid immersed panel and the other which received only the standard cure shall meet the requirements of para. 3.3.9.

4. TESTS:

4.5.9 Resistance to Thermal Shock: Three standard aluminum test panels shall be prepared by applying two parallel longitudinal sealing compound fillets 3/16 inch thick x 1/2 inch wide x 5 inches long. After standard cure, one panel shall be immersed in hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136 for seven days at 140°F; another panel shall be immersed for seven days at 140°F in a covered glass vessel containing a two-layer liquid consisting of three percent aqueous sodium chloride and hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136 with the entire panel immersed in the salt water mixture. Within 15 minutes after removal from the fluids, the exposed panels and the remaining panel which received only a standard cure, shall be placed, metal surface down, on a hot plate with a surface temperature control. The temperature of the panels shall be increased to 275°F with a temperature gradient of approximately 15°F per minute and maintained at 275°F for 15 minutes. The sealing compound fillets shall be examined for bubbling, puffing, and apparent loss of adhesion due to sponge formation at the sealing compound interface.

4.5.10 Resistance to Thermal Extrusion: A test specimen shall be prepared by drilling two holes, with a 1/16 inch diameter, two inches apart through one wall of an aluminum tube measuring 1/8 inch I.D. x 3/16 inch O.D. x 6 inches long. The tube shall be injected full of sealing compound and, after standard cure, the excess shall be removed flush with the holes and the ends of the tube. The specimen shall then be subjected to a temperature of 275°F for 24 hours.

4.5.11 Low Temperature Flexibility: The sealing compound shall be applied to a 1-1/2 x 4 inch area in the center of each of four aluminum panels which measure 0.040 x 2-7/8 x 6 inches. An accurate sealing compound thickness of 0.094 inch shall be maintained by use of a metal pressing plate coated with polyethylene film and separated from the test panels by four metal spacers 0.094 inch thick. After standard cure, two panels shall be conditioned for seven days at 275°F. Immediately after completion of the conditioning period, the two conditioned panels and the two remaining panels which received only a standard cure shall be placed in a low temperature flexibility jig. The jig shall consist of a clamp support which will grip both sides of both six-inch edges of the panels for a distance of three inches from one end without touching the sealing compound. The jig shall be capable of flexing the panel through a 30-degree arc (15 degrees each side of center) at a constant frequency of 12 cycles per minute. See Figure 3. The temperature of the test panels shall be reduced to -65° ±2°F and stabilized at that temperature for a

4. TESTS:

4.5.11 Low Temperature Flexibility: (Cont'd)

period not to exceed two hours. After stabilization, the panels shall be flexed through 130 consecutive cycles, or until the sealing compound fails.

4.5.12 Peel Strength: Nine panels each of QQ-A-287 aluminum alloy; MIL-S-5059 (Composition G) stainless steel; and MIL-T-7993, Class 1, titanium shall be coated with approximately a 1/8 inch thickness of sealing compound. After the sealing compound has immobilized, one end of a 3 x 12 inch strip of screen (wire fabric 60 to 80 mesh, brass or monel of approximately 0.008-inch diameter) shall be placed on the sealing compound on each panel, leaving a loose end six inches long. Then, an additional 1/8 inch thick coating of sealing compound shall be applied over the screen. After standard cure, three panels of each type shall be immersed for seven days at 140°F in aromatic hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136. Three additional panels of each type shall be immersed for seven days at 140°F in a covered glass vessel containing a two-layer liquid consisting of a three percent aqueous sodium chloride solution and aromatic hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136, with each panel completely immersed in the salt water solution . The remaining three panels of each type shall be immersed for 70 days at 140°F in aromatic hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136. Within one hour from the end of each immersion period, a one-inch wide strip shall be cut through the screen and the sealing compound to the metal and extended the full length of the loose end of the screen. The loose end of the one-inch wide strip shall be clamped in one jaw of a suitable testing machine and the adjacent end of the panel shall be fastened in the other jaw. The testing machine and its operation shall be in accordance with Federal Test Method Standard No. 601, Method 8031, and the machine shall be operated with a jaw separation rate of two inches per minute. The adhesion shall be measured as the average pull in pounds required to separate the coating from the metal surface. If the coating separates in cohesion and does not separate from the metal surface, the adhesion shall be reported as greater than the measured value.

4. TESTS:

4.5.13 Corrosion: Two aluminum panels (Specification QQ-A-283) measuring approximately 0.040 x 2-7/8 x 6 inches shall be prepared with two parallel sealing compound fillets on each panel, spaced approximately one inch apart. The fillets, Class A on one panel and Class B on the other panel, shall be applied 1/16 inch thick x 3/4 inch wide x 5 inches long, and shall be extended to within 1/2 inch of the edges of the panel. Before the immersion test is begun, the sealing compound shall have a standard cure and all portions of the metal panel not covered by sealing compound shall be covered with a sealant topcoat (Specification MIL-S-4383). The panels shall be immersed vertically for 20 days in a covered glass vessel containing a two-layer liquid consisting of a three percent aqueous sodium chloride solution and hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136, with 1-5/8 inches of the panel exposed to the salt mixture, 1-5/8 inches of the panel exposed to the hydrocarbon test fluid, and the remainder of the panel exposed to the air vapor mixture. The temperature during the test shall be maintained at 140°F ± 2°F. Immediately upon removal from the liquid, the panels shall be examined for softening, blistering, leaching, or loss of adhesion of the sealing compound, and for evidence of corrosion of the metal under the sealing compound.

4.5.14 Weight Loss: Sealing compound shall be cast on a non-adherent surface to form a sheet 0.090 ± 0.015 inch thick and shall be given a standard cure. Four specimens measuring 1-1/8 inches in diameter shall be cut from the cured sealing compound and weighed to the nearest milligram. Two specimens shall be immersed in each of two closed containers of 900 ml. of hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136 at 140°F. The containers shall be fitted with an air reflux tube. The fluid shall be changed every 24 hours and, after a total of 72 hours exposure, the specimens shall be removed from the fluid and air dried for 16 hours at 120°F. The specimens shall then be cooled to standard temperature and reweighed. The percent weight loss shall be calculated as follows:

$$\text{Percent weight loss} = \frac{\text{Final weight}}{\text{Initial weight}} \times 100$$

Following the weight loss calculations, the specimens shall be bent 180 degrees over a 1/8 inch diameter mandrel. If the sealing compound has not lost more than 10 percent of its weight, and has not cracked or powdered, the specimens shall be replaced in the closed containers with new fluid

4. TESTS:

4.5.14 Weight Loss: Cont'd)

and immersion shall be continued at 140°F for an additional 96 hours, changing fluid every 24 hours. At the end of 168 hours of total fuel immersion, the weight loss shall be re-calculated and another bend test shall be conducted.

4.5.15 Tensile Strength and Elongation: Sealing compound shall be cast on a non-adherent surface to form a sheet 0.125 ± 0.015 inches thick and given a standard cure. Thirty specimens, 1 x 5 inches shall be cut from the cured sealing compound and five specimens shall be exposed to each of the environmental conditions specified in Para. 3.3.16. Where fluid immersion is specified, the volume of fluid shall be 15 parts to one part sealing compound, by volume, and the fluid shall be changed at 14-day intervals. Following fluid immersion, tensile test specimens shall be prepared from the conditioned 1 x 5-inch strips of sealing compound, using the die and procedure outlined in Federal Test Method Standard No. 601, Method 4111 (Die III) and the specimens shall be bench marked. The specimens shall be tested at standard conditions on a tensile testing machine with a jaw separation rate of two inches per minute. From the test results, the average values shall be determined for tensile strength and elongation.

4.5.16 Accelerated Storage Stability: A 250 gram sample of base compound in a tightly closed one-pint container, and a tightly closed container of accelerator shall be stored for 14 days at 120° ± 5°F in a suitable ventilated oven. After cooling at standard conditions for at least 24 hours, tests shall be conducted on viscosity, flow, application time, and tack-free time, in accordance with Paragraphs 4.5.3, 4.5.4, 4.5.5, and 4.5.6, respectively.

4.5.17 Reparability: Two aluminum alloy peel panels, which contain no tab, shall be prepared in accordance with Para. 4.5.12. After standard cure, one panel shall be exposed to hydrocarbon test fluid conforming to Type III of Specification MIL-H-3136 for three days at 140°F followed by seven days at 275°F with no fuel exposure. The conditioned panel, and the panel which received only the standard cure, shall be prepared as follows: The panel shall be cleaned and freshly mixed sealing compound shall be applied over the cured sealing compound. After the sealing compound has immobilized, one end of a 3 x 12 inch strip of screen (wire fabric 60 to 80 mesh, brass or monel of approximately 0.008-inch diameter) shall be placed on the sealing compound on each panel, leaving a loose end six inches

4. TESTS:

4.5.17 Reparability: (Cont'd)

long. Then an additional 1/8 inch thick coating of sealing compound shall be applied over the screen. After a standard cure, the test specimens shall be tested in accordance with Para. 4.5.12 and shall meet the requirements of Para. 3.3.18.

5. APPLICABLE SPECIFICATIONS AND OTHER PUBLICATIONS:

5.1 The specifications shall be the issue in effect on the date of, or as defined in, the contract or purchase order. Compliance with any other issue of these specifications shall be subject to approval by Convair.

If the requirements of any of the publications referred to herein conflict with the requirements of this specification, the requirements of this specification shall apply.

5.2 FEDERAL

QQ-A-283	Aluminum Alloy (7075): Plate and Sheet
QQ-A-287	Aluminim Alloy, Clad (7075) (Aluminim-5.6 Zinc - 2.5 Magnesium - 1.6 Copper) Plate and Sheet
TT-B-846	Butyl Alcohol, Normal
TT-M-261	Methyl-Ethyl-Keytone (For Use in Organic Coatings)
TT-N-95	Naphtha; Petroleum, Aliphatic
O-P-313	Phosphoric Acid (Class A)
P-S-661A	Solvent, Dry Cleaning

5.3 MILITARY

MIL-S-5059	Steel, Corrosion Resistant (18-8), Plate, Sheet and Strip
MIL-S-4383	Sealing Compound, Topcoat, Fuel Tank, Buna-N
MIL-T-7993	Titanium, Sheet, Strip and Plate (Unalloyed) Class 1
MIL-H-3136	Hydrocarbon - Fluid, Standard Test (Type III)

5.4 STANDARDS, FEDERAL

Federal Test Method Standard No. 601 - Rubber; Sampling and Testing.

6. MANUFACTURER'S RESPONSIBILITY:

6.1 The manufacturer shall be responsible for the manufacture of the sealing compound to be procured in accordance with the requirements of this specification. None of the requirements of this specification shall be interpreted to shift to Convair any responsibility for the manufacture of sealing compound procured in accordance with the requirements of this specification..

6.2 Materials, Processes and Workmanship: Workmanship shall conform to high-grade commercial manufacturing practices. The materials and processes used shall conform to approved specifications.

6.3 Deviations and Changes: No changes shall be made in materials or formulations after a product has been approved and accepted by Convair, unless specifically requested of, and authorized by Convair in writing.

7. DATA REQUIREMENTS:

7.1 In lieu of the requirements for submitting data under applicable specifications as set forth herein, Engineering data shall be furnished to Convair as follows:

7.2 REPORTS:

(1) Six copies of data in accordance with 4.2.3
(2) Six copies of affidavits in accordance with 4.3.2 shall be submitted by the manufacturer with each lot of sealing compound received by Convair.

NOTE: Acceptance of reports or other information by Convair shall not constitute Convair approval of the reports or information.

8. PACKAGING:

8.1 Sealing compound shall be packaged in kit form. Each kit shall contain one gallon of base compound (or the amount specified in the purchase order) and the amount of accelerator required for proper curing of the sealing compound. The material shall be from one batch. The packaging shall be sufficiently durable to prevent damage during shipment.

8.2 BASE COMPOUND: Each container of base compound shall be legibly and permanently marked as follows:

Base Compound Quantity _____

Convair Specification FMS-0008

Manufacturer _____ Code No. _____

Date of Manufacture _____ Batch No. _____

Mixing Instructions: _____

Warnings: _____

8.3 ACCELERATOR: Each container of accelerator shall be legibly and permanently marked as follows:

Accelerator Quantity _____

Convair Specification FMS-0008

Manufacturer _____ Code No. _____

Use with Base Compound of Manufacturer _____ Code No. _____

Date of Manufacture _____ Batch No. _____

Warnings: _____

8. PACKAGING:

8.4 SEALING COMPOUND KIT: Each kit of sealing compound shall contain a package of base compound and a package of accelerator and shall be legibly and permanently marked as follows:

Sealing Compound: Fuel Tank and Cabin Pressure (High Temperature)

Quantity_____

Convair Specification FMS-0008

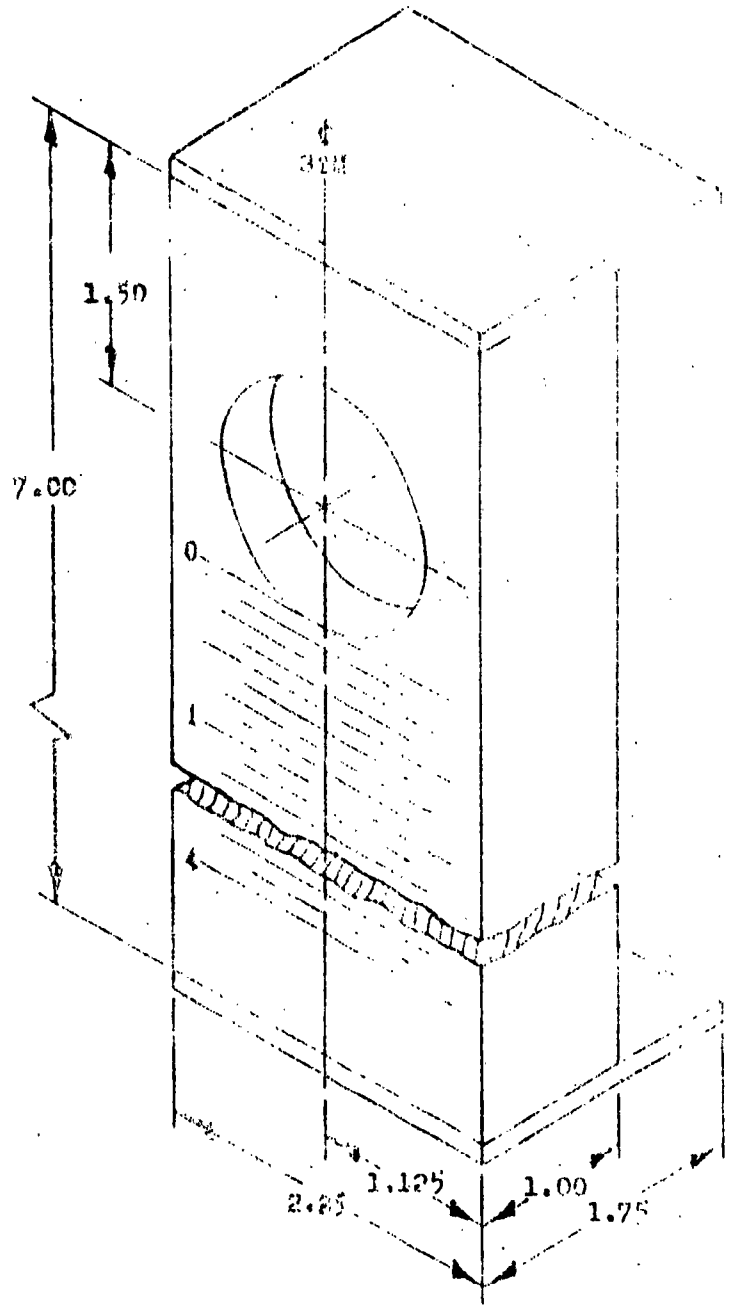
Manufacturer_____ Code No. _____

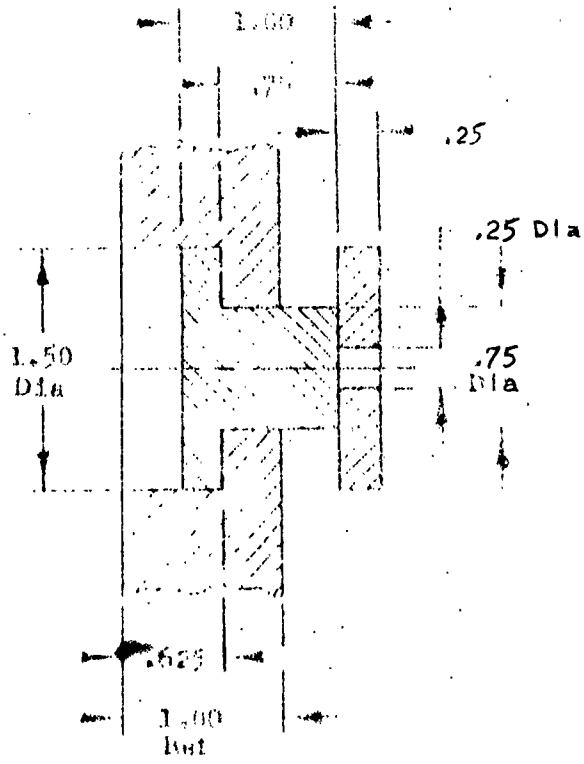
Date of Manufacture_____ Batch No._____

Mixing Instructions:_____

Purchase Order No._____

Warnings:_____





Section Through the Recessed Cavity and the Plunger

Notes:

1. Material to be aluminum alloy
2. Dimensions are in inches
3. Tolerances on dimensions to be ±0.015

Figure 1. Flow Test Jig

Notes:

1. Material to be aluminum alloy or steel
2. Dimensions are in inches
3. Tolerances on dimensions to be ±0.015

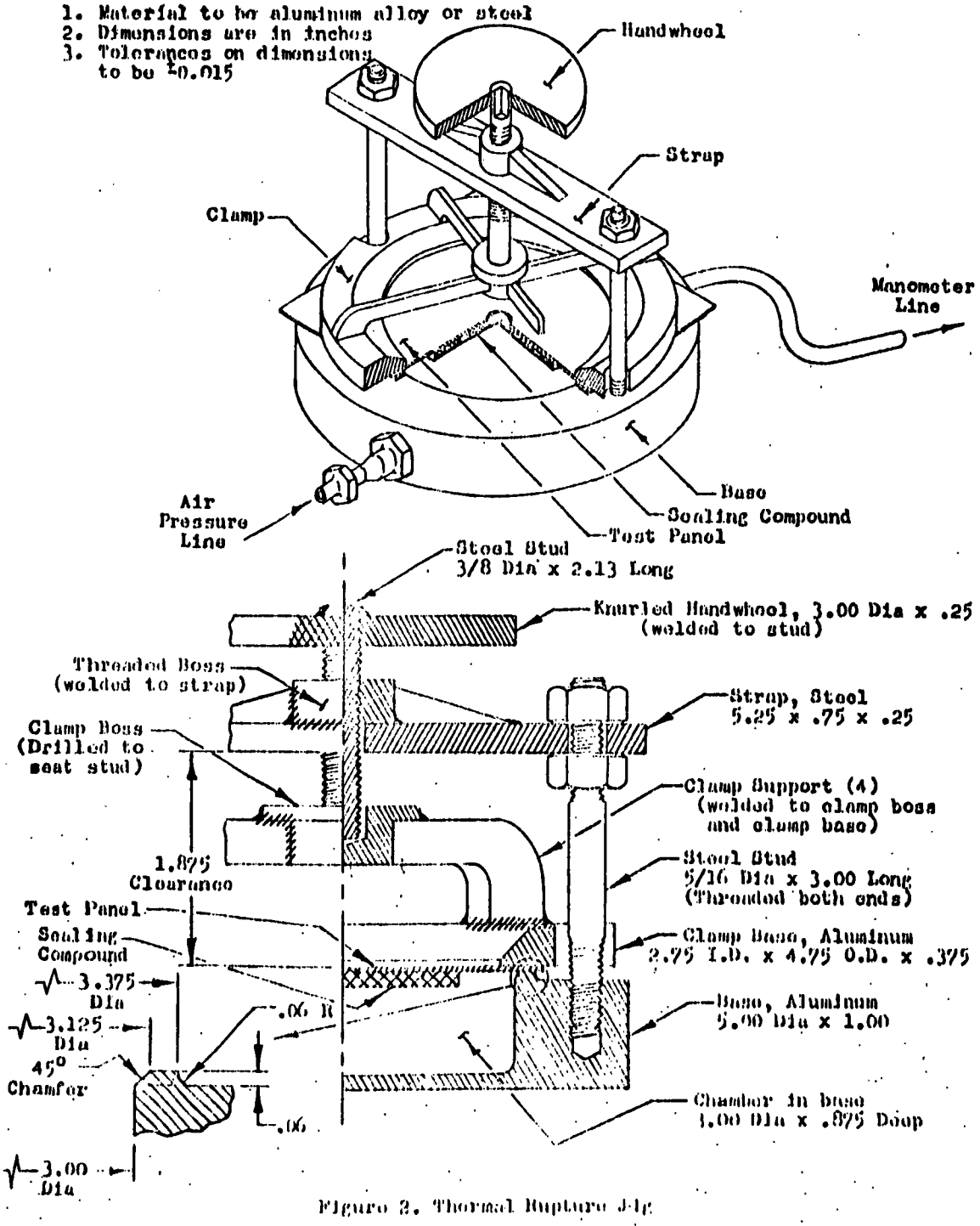
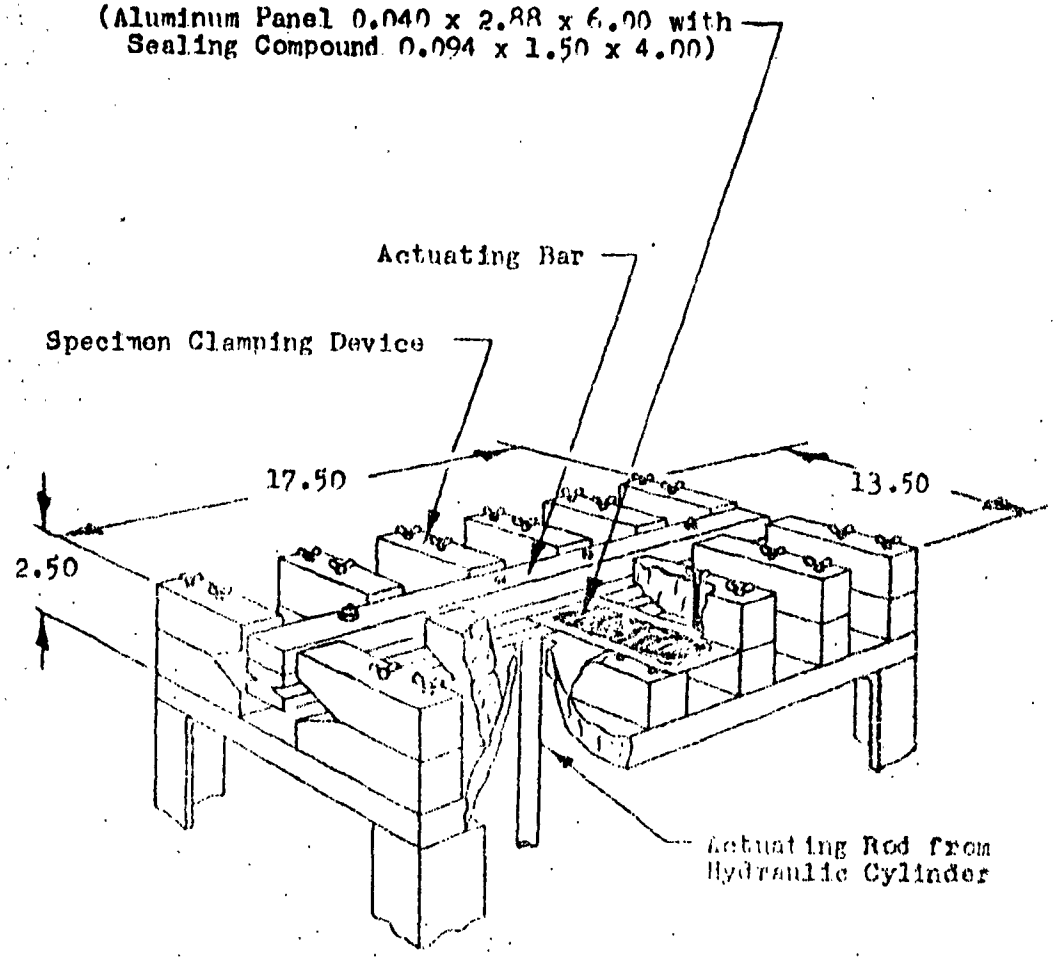


Figure 2. Thermal Rupture Jig



Notes:

1. Dimensions are in inches.
2. Tolerances on dimensions to be ±0.015.

Figure 3. Low Temperature Flexibility Jig